

Rhythms of Social Interaction: Messaging Within a Massive Online Network

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1. Introduction

College students spend a significant amount of time using online social network services for messaging, sharing information, and keeping in touch with one another (e.g. [3, 10]). As these services represent a plentiful source of electronic data, they provide an opportunity to study dynamic patterns of social interactions quickly and exhaustively. In this paper, we study the social network service Facebook, which began in early 2004 in select universities, but grew quickly to encompass a very large number of universities. Studies have shown that, as of 2006, Facebook use is nearly ubiquitous among U. S. college students with over 90% active participation among undergraduates [5, 16].

Previous research into Facebook and other social network services, such as Friendster and MySpace, has been performed using surveys (e.g. [5, 16]) and interviews (e.g. [3]). While these methods provide a deep understanding of what individuals are doing and their motivations for doing so, they do not capture large-scale patterns or temporal rhythms exhibited by the collective action of immense numbers of users.

In this paper we present a contrasting view of a social network, one that focuses on the aggregate messaging patterns of over four million members of Facebook. This approach allows us to characterize users' behavior on a large scale. And while personal idiosyncrasies and the massive scale of these social networks might lead one to conclude that one is unlikely to discover any strong global patterns of interaction, our analysis discovered

a number of strong regularities across the whole network. Most noteworthy, messaging within Facebook exhibits temporal rhythms that are robust and consistent across campuses and across seasons, resulting from the myriad individual choices that members make on when and with whom to communicate. For example, among other insights, the data strongly suggest that college students follow two patterns, a “weekend” pattern between midday Friday and midday Sunday, and a “weekday” pattern at all other times. Further, our analysis uncovers a grouping effect whereby students in the same university tend to have similar temporal messaging habits, even when the times of day in question do not appear to be a direct effect of the school schedule.

Our large-scale approach also allows us to examine, in a comprehensive manner, the effect of social variables such as school affiliation and online “friends” lists on users’ propensity to send a message. Nearly all communication was found to occur between “friends,” but only a small proportion of “friends” exchanged messages. We also found that in messaging there was a slight bias towards members of the same school, while for a particular class of messages known as “pokes” the bias was extreme.

In the remainder of the introduction, we discuss the nature of social networks in the context of the Internet and describe the characteristics of Facebook in the context of previous work. Section 2 describes our data set. Results and discussion comprise Section 3, followed by a short conclusion. Though this paper is primarily empirical in nature, explanations for our findings are suggested, where possible.

1.1 Social Networks and the Internet

On an individual level, a social network consists of all the people – friends, family and others – with whom one shares a social relationship. On a macro level, a social network demonstrates how a large group of people are connected to one another. The study of social networks attempts to explain the relationship between these two levels. Social network researchers have examined how people make friends and how many friends people have (e.g. [6, 7]), and how people rely on those in their social networks for social support.

In the past several years, internet access has proliferated, and now internet technologies are useful in supporting relationships and communities, whether proximate or geographically distant.